How to improve the public perception of hydrogen?

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1 Introduction

Most of countries which promote research and development programs on hydrogen energy have considered the public acceptance. In the open literature, results of some opinion polls are available, which have been performed in USA, Canada, Japan, Germany, Island….

In order to provide a first basis to the AIDHY project, (the objective of which is to improve the public acceptance of hydrogen as an energy vector and is supported by the French *Agence Nationale de la Recherche*), the AFH2 (*Association Française de l'Hydrogène*) has realized two opinion polls, during year 2008. The first one, during the fair of Transports and sustainable mobility, during September, in the gardens of Trocadéro and the second, on the occasion of the exhibition for equipment, technologies and services of environment (Pollutec), in Lyon, during December. We will provide the notable results of these two polls.

We will present a synthesis of opinion polls in various countries and briefly point out, the initiating circumstances, methodologies, classes of public…

Finally, we will examine how the information given to several categories of people, can influence the perception of problems linked to hydrogen energy and provide a few recommendations in order to improve the public acceptance of hydrogen.

Notable points of the two opinion polls realized by the AFH2, during exhibitions [1]

- The number of persons thinking that the electrolysis of water is today, the main process for producing hydrogen is lightly greater than that of persons thinking that it is the reforming of fossil materials.
- The use, by the past of hydrogen is ignored of the public. In practice nobody knows the two main components of the ancient city gas: hydrogen and monoxide of carbon.
- The massive production of hydrogen by electrolysis from electricity produced without CO_2 emission is predominantly considered possible for 2040, and satisfactory for most the persons having this point of view.
- The use of hydrogen in transport should be the most developing in 2040, followed by the storage of the energy either for intermittent renewable energy sources, or in the regulation of the peaks of production of electricity.
- Most of the people think, that in France, the information on technologies of hydrogen is not sufficient.

2 Synthesis of opinion polls in various countries

A classification of opinion polls which have been realized in various countries is reported in Table 1. It is possible to distinguish two main categories. Sometimes, questionnaires have been submitted to people at the occurrence of demonstration programs in relation with the use of hydrogen energy (generally hydrogen buses), in the following, there will be called post-introduction polls. At the opposite ,in some other cases, questionnaires have been proposed independently of demonstration programs, i.e. to people that never were confronted to hydrogen vehicles, for this reason, we will make mention of pre-introduction opinion polls.

Pre-introduction polls were performed in Germany, U.S.A. and France. The public acceptances for these three countries are reported in Figure 1.

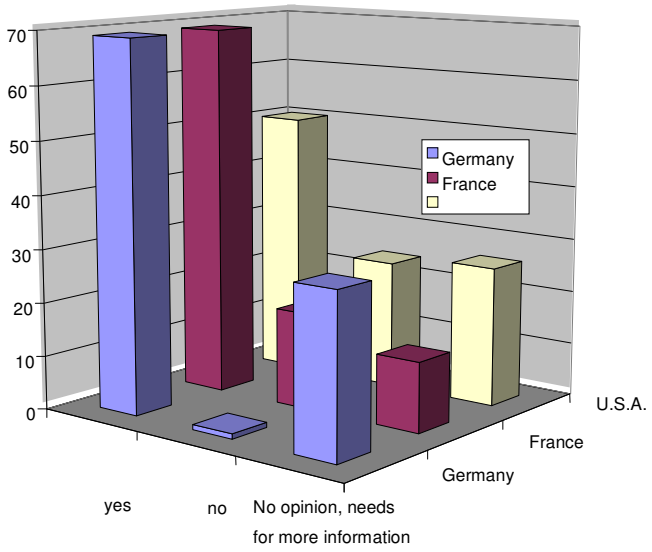

Figure 1: Public acceptance for pre-introduction polls.

We can see that approval is rather good. However many people wish to have more information. Acceptability is better in a country which is leader in hydrogen (Germany), than in a country which follows tendency (France).

As an illustration on how the public acceptance is influenced by the demonstration programs, we present in Figure 2, opinions in favour of the introduction of the fuel cells, for all the pre and post-introduction polls, which are mentioned in Table 1.

As a rule, opinions are favourable, as well in pre-introduction as in post-introduction. The proportion of favourable opinions is increased by demonstration programs, mainly when people can use buses instead of seing them only. The number of persons without opinion is also much less important in post-introduction than in pre-introduction. In both categories the lack of information and knowledge is a recurrent problem.

Table 1: Classification of opinion polls

	Post or pre-introduction	Number of polled persons	Shares Men / Women	Employment	Mean for collecting opinions
Germany* [2]	Pre	345			By telephone
	Post	200	50/50		Inside a bus
Canada [3]	Post	369	37/45 (18% did not answer)	Student: 31% Retired: 5% Other: 64%	Inside a bus
France [1]	Pre	106		Student: 11% Retired: 15% Other: 74%	During exhibitions
Island [4]	Post	200	50/50		Inside a bus
Japan [5] [6]	Post	489			On the street
	Post	400	50/50		On the street
U.S.A. [7]	Pre	889	48/52		By telephone

**For the AcceptH2 Project, piloted by Germany, opinions have been collected, not only in Berlin, but also in London and Perth.*

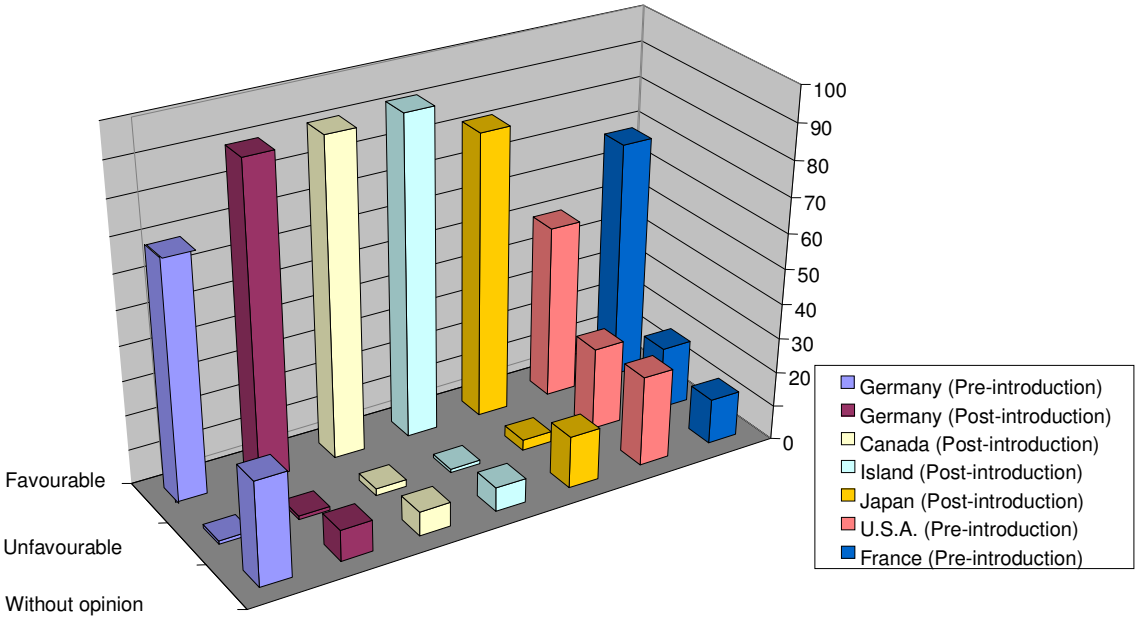

Figure 2: Opinions related to the introduction of the fuel cells.

3 Conclusion

At the occurrence of opinion polls, various questionnaires were proposed to several categories of people. It appeared that the acceptance of people is better when hydrogen as a fuel has been in public discourses. Among the favorable aspects, the ecological advantage is often advanced. The fact that at present, the hydrogen is mainly produced by reforming of the fossil resources is greatly ignored. The risk of explosion is an argument against the hydrogen, but almost nobody remembers that the hydrogen was distributed in cities during more than a century as a major component of the synthesis gas, produced from the coal and used for the lighting and the cooking of food. It is not known that until very recently the main use of the hydrogen was for the manufacturing of fertilizer and that it is now exceeded by the needs of the petroleum refineries which increase very quickly. In conclusion, we recommend not limiting the information about the hydrogen to the end uses of bus and cars working with fuel cells, but to extend it to the past and present uses of hydrogen, as well as to the other aspects of the chains from production to end uses, with a particular care for the ecological processes of production of hydrogen, without greenhouse gas emission.

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